

தமிழ்நாடு

Department of Transportation

Specifications for Railroad Tank Cars Used To Transport Hazardous Materials; Notice of Proposed Rulemaking

**DEPARTMENT OF TRANSPORTATION
Research and Special Programs
Administration**

49 CFR Part 173 and 179

[Docket No. HM-175; Notice No. 83-1]

**Specifications for Railroad Tank Cars
Used To Transport Hazardous
Materials**

AGENCY: Materials Transportation Bureau (MTB), Research and Special Programs Administration, DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: This notice proposes changes in the construction and maintenance standards for railroad tank cars used to transport hazardous materials. References to various specification tank cars are to DOT specifications. The proposed changes are as follows:

(1) After December 31, 1986, specification 105 tank cars built before September 1, 1981, that have a capacity exceeding 18,500 U.S. gallons and are carrying a flammable gas, anhydrous ammonia or ethylene oxide would have to be equipped with lower half tank head protection (such as a head shield);

(2) After December 31, 1986, specification 105 tank cars built before September 1, 1981 that have a capacity exceeding 18,500 U.S. gallons and are carrying a flammable gas or ethylene oxide would have to be equipped with: (a) High temperature thermal insulation; and (b) safety relief valves sized according to the requirements for specification 112 and 114 tank cars; and

(3) After December 31, 1986, specification 111 tank cars that have a capacity exceeding 18,500 U.S. gallons and are carrying flammable gas or ethylene oxide would have to be equipped with: (a) Lower half tank head protection; (b) high temperature thermal insulation; and (c) safety relief valves sized according to the requirements for specification 112 and 114 tank cars.

In brief, the proposed rule would require that specifically identified hazardous materials being transported in existing large capacity specification 105 and 111 tank cars have the same added tank head and thermal safety systems that are now required on newly built specification 105 tank cars (HM-174) and on all specification 112 and 114 tank cars (HM-144) when carrying those same commodities.

DATE: Comments must be received on or before June 7, 1983.

ADDRESS: Comments should be addressed to the Dockets Branch, Materials Transportation Bureau, U.S. Department of Transportation, Washington, D.C. 20590. Comments

should identify the docket number and notice number and be submitted, if possible, in five copies. The Dockets Branch is located in Room 8426 of the Nassif Building, 400 Seventh Street, S.W., Washington, D.C. 20590. Public dockets may be reviewed between the hours of 8:30 a.m. and 5:00 p.m., Monday through Friday, except public holidays.

FOR FURTHER INFORMATION CONTACT: Philip Olekszyk, Office of Safety, Federal Railroad Administration, Washington, D.C. 20590, (202) 426-0897.

SUPPLEMENTARY INFORMATION: At the time DOT commenced its review of specifications for pressure tank cars in the early 1970's, there had been a number of serious railroad accidents involving rail transportation of flammable compressed gases, toxic compressed gases and other hazardous materials. Most of these accidents involved uninsulated pressure tank cars of large capacity (over 18,500 U.S. gallons) built to specification 112 and 114.

Since the specification 112 and 114 tank car shipments of hazardous material were determined to present a more serious threat to public safety, MTB and the Federal Railroad Administration (FRA) assigned first priority to improving the construction and maintenance standards applicable to those cars. It was further decided that after these specification 112 and 114 tank cars had been structurally upgraded, the MTB and FRA would then consider a revision of the standards applicable to the specification 105 tank cars.

Accordingly, on September 15, 1977, MTB published a final rule in Docket HM-144 (42 FR 46306). In summary, the rule requires that:

1. Existing and newly built specification 112 and 114 tank cars used to transport flammable gases such as propane, vinyl chloride and butane have both thermal protection (large capacity safety relief valves and high temperature thermal insulation) and tank head protection (such as a head shield);

2. Existing and newly built specification 112 and 114 tank cars used to transport anhydrous ammonia have tank head protection; and

3. All specification 112 and 114 tank cars be equipped with special couplers designed to resist coupler vertical disengagements (self couplers).

After the upgrading of specification 112 and 114 tank cars was substantially completed, MTB initiated rulemaking for specification 105 tank cars. On January 26, 1981, MTB published a final rule in Docket HM-174 (46 FR 8005) affecting

new construction of specification 105 tank cars. That final rule also includes a shelf coupler requirement applicable to all specification tank cars. The rule requires that:

(1) Specification 105 tank cars built before March 1, 1981, be retrofitted over a one-year period ending on February 28, 1982, with a coupler vertical restraint system equivalent to that required on specification 112 and 114 tank cars;

(2) All other specification tank cars built before March 1, 1981, be equipped with a coupler vertical restraint system equivalent to that required on specification 112 and 114 tank cars over a four-year period ending on February 28, 1985;

(3) After February 28, 1981, newly built specification 105 tank cars be equipped with a coupler vertical restraint system equivalent to that required on specification 112 and 114 tank cars;

(4) After August 31, 1981, newly built specification 105 tank cars transporting flammable gases, anhydrous ammonia and ethylene oxide be equipped with a tank head puncture resistance system equivalent to that required on certain specification 112 and 114 tank cars (S, T, and J cars);

(5) After August 31, 1981, newly built specification 105 tank cars transporting flammable gases and ethylene oxide be equipped with high temperature thermal insulation equivalent to that required on certain specification 112 and 114 tank cars (T and J cars); and

(6) After August 31, 1981, newly built specification 105 tank cars transporting flammable gases and ethylene oxide be equipped with safety relief valves sized according to the requirements for specification 112 and 114 tank cars.

On July 21, 1980, the same day the notice of proposed rulemaking in Docket HM-174 was issued, MTB also issued an advance notice of proposed rulemaking (ANPRM) in Docket HM-175 (45 FR 48668). That notice sought additional information to allow an evaluation of the need, means, and cost to extend the specified puncture and thermal protection levels of specification 112 and 114 tank cars to:

1. Existing specification 105 tank cars used to transport the same hazardous materials permitted in specification 112 and 114 tank cars;

2. Existing specification 105 tank cars used to transport other hazardous materials such as ethylene oxide, butadiene, poisons, and combustible and flammable liquids or solids; and

3. All other new and existing specification tank cars used to transport the same hazardous materials permitted

in specification 105 tank cars, e.g., specification 111 tank cars.

Comments received in response to the ANPRM and the substantial body of information developed in Dockets HM-144 and HM-174 have been considered in developing the rule proposed in this notice. In all, thirty-eight comments to the ANPRM were submitted to MTB. The depth of coverage in response to the eighteen questions posed by MTB ranged from one or two-page documents limited to a single concern, general observations, or a blanket endorsement of some other commenter's submittal, to documents of more than forty pages covering each of the major issue areas.

Question #1: Accident Data

In the ANPRM, MTB requested details of accidents involving a broad range of hazardous materials according to specification tank car and designated subgroup tank car design characteristics. The tank car subgroup designs were specified in the ANPRM.

Ten responses contained some accident data. Most of the comments were directed at individual commodities or limited movements. One commenter supplied detailed accident data on all major hazardous material rail accidents since 1958. Other commenters supplied accident data on particular hazardous materials or tank car fleet basis. Although the great majority of tank cars included in these data carried flammable gases or anhydrous ammonia, other hazardous materials also were mentioned. These other hazardous materials included ethylene oxide, chlorine, motor fuel anti-knock compound, nitrogen fertilizer solution, refrigerants/dispersants/fluorocarbons, carbon dioxide, sulfur dioxide, ethyl ether, metallic sodium, anhydrous hydrofluoric acid, benzene, acrolein, hydrogen sulfide, vinyl acetate, flammable liquids, propylene oxide, and anhydrous hydrochloric acid. The comments received in this area did not contradict or significantly add to MTB's own data base.

Question #2: Existing Protection Levels

The MTB requested comments on how the levels of head and thermal protection should be ascertained for the various subgroups of existing specification 105 tank cars. Specifically, MTB asked if a point value system reflecting each type and thickness of material should be established.

Most commenters either directly stated or inferred that the levels of needed protection cannot be established for other hazardous materials in the same way as for flammable gases. They contend that safety requirements should

be based on the characteristics of the hazardous material being transported and the risks inherent in its transportation by rail. Some commenters noted that the Railway Progress Institute (RPI), the Association of American Railroads (AAR), and FRA were conducting scale model testing and that specific methodologies should await final test results. Several commenters stated that full scale testing was needed to determine the degree of protection provided to such hazardous materials by various specification tank car designs. One commenter recommended that objective engineering formulas from FRA test data be developed to relate the physical and thermal characteristics of the head/tank material, insulation material, jacket material, and tank design.

Overall, MTB did not receive any analyses or approaches to evaluate the levels of puncture and thermal protection that the various specification 105 tank cars now possess. The commenters tended to avoid this question on the grounds that it was not feasible, without additional testing, to determine the levels of protection now provided by the various specification 105 tank car designs.

Question #3: Identification and Marking

The MTB requested information on the processes that might be employed to identify and mark each car in the fleet according to the level of head and thermal protection it possesses.

Most commenters answered this question in the same way as for Question #16 on stenciling. They recommend that the current stenciling methods and the alphanumeric system to identify particular car/commodity/protection for specification 112/114 and new specification 105 tank cars be extended to all specification 105 tank cars.

Question #4: Commodity Specific Protection

The MTB solicited comments on whether a different level of thermal and head protection is needed for hazardous materials other than those carried in specification 112 and 114 tank cars. For those hazardous materials which may need different levels of protection, MTB also requested information on what the levels should be and the reasons for the protection level selected. In addition, MTB asked for suggestions on how cars carrying these hazardous materials should be identified and marked.

The commenters who responded to this question believed that hazardous materials should be evaluated individually, with many requiring

different or lesser levels of protection than required for the hazardous materials addressed in HM-144. Several commenters offered specific examples of hazardous materials that warrant special protection consideration. Several commenters felt that the existing requirements are already in proportion to protection needs; e.g., the authorized tank car is often required to be constructed to a higher strength specification than the vapor pressure of the hazardous material at ambient temperature warrants.

Commenters generally restricted their opinions to products and car types with which they were directly associated. A variety of reasons were offered in support of various positions.

Two commenters noted that there has never been an incident involving loss of product from a tank car transporting metallic sodium and the metallic sodium is shipped at low vapor pressure. Therefore, they conclude that there is no need for head and thermal protection of tank cars used to transport metallic sodium.

One commenter felt that there might be a justification for a heavier head jacket for cars carrying pyrophorics. The same commenter claimed that there was no justification for retrofit of motor fuel anti-knock compound cars because the disaster potential was much less than for some of the other hazardous materials transported in specification 105 tank cars.

Several commenters identified flammable gases, ethylene oxide, chlorine, and certain poisons as commodities that may be candidates for additional protection. One commenter believed that flammable liquids and combustible liquids have characteristics that do not require the same protection level as do flammable or poisonous gases.

Another commenter cited ethylene oxide, chlorine, and acrolein as hazardous materials that may need additional protection. This commenter believed that the HM-144 thermal protection requirement would not be appropriate for chlorine and acrolein. It was noted that the HM-144 requirement is designed to prevent tank steel from exceeding 800°F for a specific time during exposure to torch or pool fires, whereas chlorine reacts with steel at about 500°F and acrolein polymerizes at about 400°F. Another commenter noted the steel-chlorine reaction problems and suggested that future testing should be directed at producing high temperature insulating systems to improve the thermal resistant performance of chlorine cars. This commenter noted

that, for chlorine cars, there have been more shell punctures than head punctures. Therefore, the commenter concluded that if a thicker tank head or jacket is necessary, then consideration should be given to requiring thicker material for the entire tank. One commenter identified chlorine, vinyl chloride, and isobutylene as the most viable hazardous materials for tank car retrofitting. Another commenter pointed to ethylene oxide cars as the cars most needing retrofit.

No consistent or rigorous criteria for ranking hazardous material in order of the need for additional protection levels evolved from the comments submitted.

Question #5: Accuracy of MTB Estimates

The MTB included in the ANPRM a table of car groupings and estimated protection levels to stimulate comments. It is entitled, "Summary of Estimated Protection Provided by Broad 105 Car Classification Sub-Groupings." Comments on the applicability and accuracy of the table were solicited.

No in-depth analyses or detailed comments pertaining to the table were supplied by the commenters. Several commenters felt that the table represented a reasonable breakdown of the specification 105 tank car fleet. Some suggested that the breakdown of the specification 105 tank car fleet in the table be compared with the results of a study being done by Dynatrend for FRA and/or with the results of Phase 17 of the RPI/AAR Tank Car Project. A more detailed breakdown of the specification 105 car fleet (e.g., hazardous material, by car size, and by car accident history) was recommended by others. Most commenters, however, only addressed the number of cars in each subgroup, not the estimated protection levels of the subgroups.

The commenters generally felt that the two columns offered by the MTB on the estimated status of the tank head and thermal protection of the subgroups were subjective. Many stated that additional testing was needed to quantify the existing levels of head and thermal protection by car design. One commenter felt that the table was misleading for anhydrous ammonia since the table indicates that specification 105 anhydrous ammonia cars have significantly less thermal protection than HM-144 requirements, even though high temperature thermal protection is not required in HM-144 for specification 112 and 114 tank cars used to carry anhydrous ammonia.

Question #6: Fleet Characteristics

The MTB asked that tank car owners and users provide breakdowns of specification 105 tank cars owned or used according to appropriate sub-groupings and characteristics in the table published in the ANPRM.

The limited data submitted did not permit MTB to compile a more accurate or comprehensive characterization of the specification 105 tank car fleet.

Question #7: Retirement, Displacement, Retrofit Considerations

The MTB requested that tank car owners estimate how many specification 105 tank cars would be retired, displaced, or retrofitted if HM-144 performance levels were mandated for the entire specification 105 tank car fleet.

Generally, it appears that the responses to this question were made from varying assumptions as to what the final rule requirements would be. Hence, it is impossible to draw any firm conclusions on the number of cars that would be displaced, retired, or retrofitted if a retrofit requirement for the entire 105 tank car fleet was established.

Question #8: Reasons and Consequences of Retirement or Displacement of Tank Cars

Comments were requested about the reasons for and economic consequences of the retirement of certain cars in lieu of retrofitting. Comments were also requested about the reasons for and the economic consequences of changing car usage rather than retrofitting. The MTB further requested that commenters provide specific information on the age and size of cars which would be considered as strong candidates for retirement or for a change in usage.

Most commenters answered this question in a way which suggested that actual "real world" decisions would have to await a clearer expression of regulatory intent. Various rather general individual opinions were advanced. One commenter stated that cars 28 years or older would be retired because the retrofit cost could not be fully depreciated over the remaining life of those cars. Another commenter stated that cars listed in the ANPRM Table as subgroup C (LPG) would either be scrapped, or converted to a non-pressure class if a demand for other use could be found for those cars. Another commenter identified small tank cars (approximately 11,000 gallon size) as being strong candidates for a change in usage or retirement.

Question #9: New Car Procurements

Comments were requested on the effect that tank car retirement or usage changes would have on new car procurements.

Most comments were not detailed or specific. It was difficult to determine a consistent or overall direction of the replies. Some commenters stated that all of the retired/displaced cars would be replaced, while one said that none of the retired/displaced cars would be replaced.

The MTB did not obtain new information from the comments which significantly aided in estimating the impact that the regulatory changes would have on new car procurements.

Question #10: Technical Feasibility of Retrofitting

Assessments of the technical feasibility of retrofitting specification 105 cars were solicited by MTB.

Most of the commenters who responded to this question did not advance technical doubts as to the feasibility of accomplishing the potential retrofit. There were strong opinions that it was not economically practical (because of high costs) to retrofit tank cars by replacing existing valves with larger safety valves. There were also general objections to a retrofit based on the belief that an unretrofitted specification 105 tank car is safer than the unretrofitted specification 112 and 114 tank cars built prior to HM-144.

Even though no significant retrofit obstacles were identified, several commenters observed that because of the growth in diameter of tanks, insulation thickness was restricted by clearance dimensions along railroad rights-of-way. Other commenters considered retrofitting as feasible from a purely technical aspect, but thought that additional testing would be necessary to resolve certain design questions. Several commenters expressed uncertainties concerning the length of time that external coatings applied to specification 105 car jackets could be expected to meet high temperature thermal protection requirements without losing mechanical integrity in severe railroad operational environments.

Question #11: Retrofit Cost Estimates

The MTB requested estimates of the prospective costs of retrofitting given types of specification 105 tank cars. The MTB asked that commenters specify the subgroup and relevant car characteristics (e.g., capacity) upon which their estimates were based; that the specific cost elements be isolated; and that the type of protection system

be identified. In addition, cost estimates for out-of-service time and other cost factors were requested.

The nature and the amount of the estimates supplied by the commenters varied over a wide range. In some cases, it was not clear what cost elements were embraced by the totals.

Question #12: Retrofit Priorities and Timeframes

The ANPRM solicited comments concerning what retrofit priorities and timeframes might be reasonable, and the basis for the priorities and timeframes advocated.

Several of the commenters, while registering doubts about the justification of a retrofit, stated that any retrofit priority should be based on the characteristics of the hazardous materials, with the timeframe related to the need for retrofit, the number of cars affected, and the availability of shop space. One commenter recommended that the retrofit priorities should be based upon the Environmental Protection Agency's Hazardous Substances Categories, and that the number of cars known to be in each of these priority categories would then provide a basis for arriving at reasonable retrofit timeframes. Several commenters believed that retrofit priorities should be based on the characteristics of the hazardous material and car size while one commenter believed that retrofit priorities should be based upon a reconciliation of the level of hazard inherent in the hazardous material and the degree of protection already existing in the cars used. Several commenters suggested priority be given to the HM-144 commodities (flammable gases and anhydrous ammonia).

Question #13: Safety Relief Valves

The MTB asked for comments on the adequacy of current safety relief valves and the extent to which relief valves or discs can be modified on existing cars.

The large majority of commenters felt that a requirement should not be imposed that would mandate replacement of existing valves with larger ones. Although one commenter believed that larger safety valves are of benefit and recommended continued use wherever feasible, many other commenters expressed the opinion that the relief valves currently used on specification 105 tank cars are adequate. The only commenter who discussed directly the feasibility of modifying relief valves or discs stated that existing relief valves on specification 105 tank cars cannot be modified to obtain a larger capacity.

The primary concern of the commenters is the large cost that would be involved if installation of a large capacity safety valve requires cutting a larger hole in the tank. However, the commenters did not indicate the number of cars which would require the cutting of a larger hole.

Question #14: Peculiar Problems or Impacts

The MTB requested information on problems or impacts unique to a commenter's situation, including whether the owner or shipper was a small business.

The general flavor of the comments was that those small businesses owning or operating only a few cars would tend to suffer the most if a comprehensive retrofit were to be required. As in answers to several other questions, commenters seemed to be concerned that an arbitrary requirement might be imposed which would be expensive to comply with and provide little real direct benefits in return.

Question #15: Proof of Performance Levels

The MTB requested opinions on the methods or processes that should be utilized to determine the degree to which given tank head or thermal protection systems meet or exceed a specified performance level.

Several commenters favored complete full-scale testing to prove the effectiveness of proposals in new areas. One commenter suggested that both full-scale puncture and drop hammer tests be performed for systems not previously tested. Several commenters endorsed the FRA thermal test program which was then underway as a step in the right direction.

Question #16: Stenciling

The MTB asked for comments on the requirements, procedures and methods that might be utilized in stenciling or labeling the tank cars.

Most commenters felt that current methods for tank car stenciling could be easily augmented to advise the shippers of the degree of protection provided by specific car types.

Question #17: Reporting Needs

The MTB asked for comments on the reporting requirements for monitoring the progress of any mandated retrofit program.

Most commenters stated that if a reporting requirement is considered necessary then a system similar to that used for HM-144 should be adopted. Several commenters recommended a quarterly reporting schedule, while

others recommended a semi-annual report schedule. One commenter suggested that industry should submit to DOT a timetable to monitor progress on a quarterly basis and that DOT should require reports by exception, *i.e.*, from only those who are not meeting the submitted schedule.

Question #18: Operational Substitutes

The MTB asked for comments on operational changes that might be instituted in lieu of retrofitting and still provide acceptable protection levels.

Several commenters suggested that DOT should await recommendations of the Systems Safety Analysis Group of the Inter-industry Task Group. Other commenters suggested that a rule, similar to FRA Emergency Order No. 5, should be adopted. Several commenters believed that operational changes are a more costly solution, especially since they are recurring costs, and should not be required.

Discussion

The MTB and FRA have examined the comments received in respect to actual accident trends, previous regulatory actions, testing results, technical evaluations, traffic statistics and other pertinent information in the possession of MTB and FRA. As a part of this examination, several options were developed and evaluated. A comprehensive benefit-cost analysis was employed to assess the relative merits of each major option.

The provisions of this NPRM are discussed in relationship to each of the three areas of consideration listed in the ANPRM.

The first area addressed in the ANPRM was the issue of extending the specified puncture and thermal protection levels of specification 112 and 114 tank cars (HM-144) to existing specification 105 tank cars that transport the same commodities as specification 112 and 114 tank cars.

In assessing the advisability of regulatory action in this area, the MTB and FRA note that:

(a) Any specification 112 tank car, 114 tank car, or 105 tank car built after August 31, 1981 must have a specified puncture protection level, thermal protection level and safety valve sizing as appropriate, when used to transport flammable gases and the toxic non-flammable gas, anhydrous ammonia.

(b) The safety improvement effectiveness of these protection requirements has been established through operating experience;

(c) Almost all of the flammable gas and anhydrous ammonia rail movement

volume in specification 105 tank cars is carried in newer cars having capacities in excess of 18,500 gallons;

(d) Other than having jacketed ambient temperature insulation, the basic design of the large capacity specification 105 tank cars is essentially similar to the specification 112 and 114 tank cars prior to being retrofitted in accordance with HM-144;

(e) Requiring retrofit of the safety valves on existing large capacity (over 18,500 U.S. gallons) specification 105 tank cars will not require cutting a larger hole in the tank since these cars have a manway cover with an 18 inch diameter; and

(f) The benefit-cost ratio for the retrofit of these large specification 105 tank cars (numbering about 3,000) is positive.

The FRA has determined that the retrofit of specification 105 tank cars would be cost beneficial, provided that the retrofit requirement is limited to those cars having capacities exceeding 18,500 U.S. gallons and used to transport those hazardous materials that historically have an unfavorable accident history and disaster potential (i.e., LPG, ethylene oxide, and anhydrous ammonia). The retrofit proposed in this NPRM requires protection systems that are identical or substantially similar to those that have been extremely successful when applied to other tank cars transporting these commodities. The selection of large capacity specification 105 tank cars for retrofitting is consistent with the previous tank car retrofit rulemaking (HM-144) since the specification 112 and 114 tank cars previously required to be retrofitted were large capacity cars.

A large capacity safety valve is proposed because the combination of thermal insulation and larger safety valve provides the best level of safety. The large safety valve minimizes the product left in the tank at the point of tank failure and provides additional benefits in the case where the car is overturned and must vent liquid as well as vapor.

The cost involved in requiring a large capacity safety valve, as was required in HM-144 and HM-174, is not excessive since MTB and FRA are proposing a rule limited to tank cars with a volume over 18,500 gallons. The MTB and FRA believe that most, if not all, of these cars already have a manway of at least 18 inches in diameter, i.e., large enough to be equipped with the large capacity valve. Thus, no changes in the tank structure, would be necessary. At most, a new manway cover plate will be necessary.

For those tank cars with a manway cover having a major dimension or diameter of less than 18 inches, MTB and FRA have proposed an alternative system that would allow the use of additional thermal protection in conjunction with existing safety valves. With this system, there should be no liquid remaining in the tank car at the moment of failure in those incidents in which the tank car remains upright. Under this option, there could be situations where the tank car pressures slightly exceed the pressures prescribed in § 179.100-15 and § 179.102-11; however, the pressures would not exceed the tank test pressure. A technical analysis explaining the safety validity of this option, and the consistency of the option with safety criteria established in HM-144, is in the docket.

The MTB and FRA are interested in determining the number of tank cars, if any, that have a manway cover with a major dimension or diameter of less than 18 inches. Therefore, it is requested that tank car owners who have cars with a manway cover having a major dimension or diameter of less than 18 inches provide the following information in their comments to the docket:

- (a) The reporting mark(s) of the car(s);
- (b) the manway cover diameter or major dimension, layout, and arrangement, including the location of all valves and fittings;
- (c) a description of the existing insulation system on the tank car; and
- (d) a list of all hazardous materials that are transported in the particular car(s).

At the present time and with the information available, MTB and FRA do not believe a rule requiring a retrofit of existing specification 105 tank cars having capacities less than 18,500 gallons carrying the identified hazardous materials is warranted on a cost/benefit basis. Many of these cars are nearing the end of their service life. Hence, the cost of retrofit might not be recovered in the remaining tank car life. More importantly, these smaller capacity cars have a lower utilization rate, reducing their exposure to potential accident situations. Finally, their smaller capacity presents a smaller safety risk should they be involved in an accident.

The second area of consideration for potential rulemaking listed in the ANPRM was to extend the specified puncture and thermal protection levels of specification 112 and 114 tank cars (HM-144) to existing specification 105 tank cars that transport other hazardous materials such as ethylene oxide,

butadiene, poisons, and combustible and flammable liquids or solids.

Beyond some general mention of certain hazardous materials, the commenters did not support the extension of thermal and puncture requirements as applied to flammable and toxic poisons to "other" hazardous materials carried in existing specification 105 tank cars. The MTB and FRA have reviewed the safety record and the threats posed by all of the hazardous materials carried in specification 105 tank cars. Using the same rationale as was used in the final rule in HM-174, the MTB and FRA believe that the characteristics and threats posed by ethylene oxide are so close to materials classes as flammable gas that the same retrofit requirements should be adopted for tank cars used to transport this material. The expected benefits are the same as those identified for flammable gases.

The FRA is unable to justify similar retrofit requirements for specification 105 tank cars carrying other hazardous materials. This is true even though hazardous materials such as chlorine, acrolein, and motor fuel anti-knock compounds have properties that pose a high risk in accidents. However, these hazardous materials differ from flammable gases in that the identical level of thermal protection may not provide the same duration to failure or alleviate the potential catastrophic consequences to the same degree. Moreover, these hazardous materials are often carried in cars with different and better relative protection levels than tank cars authorized for flammable gases.

In regard to thermal protection, the more dangerous of the other hazardous materials undergo rapid decomposition or polymerization at elevated temperature, but neither the failure mechanisms nor countermeasures are as yet adequately tested or understood. For example, in the case of chlorine, it has not been determined that there have been any accident consequences that would definitely have been avoided if high temperature thermal protection identical to that required for flammable gases had been in place. Moreover, unlike flammable gases, a thermally induced rupture of a chlorine car would not increase the fire or continue a chain reaction spread of fire engulfment.

The MTB and FRA also considered increased puncture resistance for existing cars carrying hazardous materials such as chlorine, motor fuel anti-knock compound, and sulfur dioxide. The MTB and FRA are not convinced that an increased puncture

resistance requirement is justified based on accident experience and the current protection levels built into the cars authorized to transport these materials. The primary basis for this view is the fact that these hazardous materials are required to be shipped in tank cars with pressure ratings in excess of that needed to contain these products. Therefore, these cars already have some increased degree of built-in puncture resistance. Although this tank head puncture resistance may not be equivalent to HM-144/HM-174 performance levels, the safety record of these cars is such that MTB and FRA cannot now justify their retrofit or redesign to achieve an incremental amount of additional protection. It should also be noted that all specification 105 tank cars carrying hazardous materials are now required to have shelf couplers (per HM-174), which diminishes the probability of coupler-inflicted tank punctures.

With the exception of ethylene oxide, MTB did not find sufficient threats to safety, nor cost-benefit justification, for proposing an extension of thermal and head protection for tank cars to materials other than those addressed in dockets HM-144 and HM-174.

The final area of consideration identified in the ANPRM suggested that there may be safety benefits in regulatory action to extend the specified puncture and thermal protection levels of the specification 112 and 114 tank cars (HM-144) to other new and existing specification tank cars that carry the same hazardous materials as specification 105 tank cars, e.g., certain specification 111 tank cars.

The MTB and FRA have examined the hazardous materials transported in both specification 105 tank cars and specification 111 tank cars. There are approximately 300 specification 111A100W4 tank cars that are authorized to move flammable gases and ethylene oxide, the hazardous materials determined by MTB and FRA to warrant additional protection. The size of this fleet will not increase, because on October 9, 1981 the Association of American Railroads (AAR) specified that:

(a) After October 1, 1981, no specification 111A100W4 tank cars may be newly built for or converted to ethylene oxide service. Existing specification 111A100W4 tank cars in ethylene oxide service must comply with the coupler restraint requirements of 49 CFR § 179.105-6 by March 31, 1982; and

(b) After October 1, 1981, each class 105 tank car converted to ethylene oxide service must comply with Class 105] coupler restraint, head shield and

thermal protection requirements for new construction.

However, for the same reasons as previously stated with respect to the large (over 18,500 U.S. gallons) specification 105 tank cars, MTB and FRA believe that the retrofit of the large specification 111 tank cars carrying ethylene oxide and flammable gases is cost beneficial.

In order to be consistent with the AAR actions and avoid unnecessary complexity, the proposed rule does not authorize any newly constructed specification 111 tank cars for ethylene oxide or flammable gas service. New construction of specification 111 tank cars is not needed since specification 105 tank cars may be constructed to carry these commodities.

Section-By-Section Analysis

Section 173.124 Ethylene oxide.

It is proposed to amend paragraph (a)(5) of § 173.124 to require that each specification 105 tank car built before September 1, 1981, with a capacity in excess of 18,500 U.S. gallons, shall conform to specification 105] when transporting ethylene oxide after December 31, 1986. (Specification 105 tank cars built after August 31, 1981 are currently required to conform to specification 105] when transporting ethylene oxide.) Requiring a specification 105] tank car would mean that existing specification 105 tank cars would have to be retrofitted with high temperature thermal protection, tank head protection, and large safety valves by December 31, 1986 if they are to continue in ethylene oxide service.

It is also proposed to amend paragraph (a)(5) to require that each specification 111 tank car, with a capacity in excess of 18,500 U.S. gallons, conform to specification 111] when transporting ethylene oxide after December 31, 1986. Thus, each existing specification 111 tank car would have to be retrofitted with high temperature thermal protection, tank head protection, and large safety valves by December 31, 1986 in order to continue to carry ethylene oxide.

Section 173.314 Requirements for compressed gases in tank cars.

It is proposed to amend this section to require that existing DOT specification 105 tank cars (those built prior to September 1, 1981) used to transport anhydrous ammonia, and with a capacity exceeding 18,500 U.S. gallons capacity, be retrofitted by December 31, 1986 with lower tank head protection, i.e., conform to specification 105S. It is further proposed that existing

specification 105 tank cars with a capacity exceeding 18,500 U.S. gallons, used to transport flammable gases, be retrofitted with thermal protection, head protection, and large safety valves by December 31, 1986, i.e., conform to specification 105]. It is also proposed to require that each specification 111 tank car with a capacity exceeding 18,500 U.S. gallons, used to transport flammable gases, shall conform to specification 111].

Section 179.102-12 Ethylene oxide.

It is proposed to amend this section to require that existing specification 105 tank cars (built prior to September 1, 1981 and with a capacity exceeding 18,500 gallons) used to transport ethylene oxide be retrofitted with high temperature thermal protection, tank head protection, and large safety valves by December 31, 1986 if they are to continue in ethylene oxide service.

Section 179.105-7 Safety relief valves.

It is proposed to add a new paragraph (c) which would allow the use of smaller safety valves if the thermal protection exceeds the minimum thermal protection required in § 179.105-4.

Section 179.106-1 General.

It is proposed to amend this section by requiring that existing specification 105 tank cars manufactured to the specifications of the Canadian Transport Commission conform to the same standards prescribed for DOT specification 105 tank cars.

Section 179.106-3 Previously built cars.

It is proposed to amend this section by establishing performance requirements for specification 105S and 105J tank cars build before September 1, 1981. The proposed requirements for the 105S and the 105J tank cars in this section are identical to the requirements in § 179.106-2 for new cars.

Section 179.200-27 Alternative requirements for tank head puncture resistance systems.

It is proposed to add this section to clarify that specification 111 tank cars may utilize a head shield as prescribed in § 179.100-23 instead of meeting the puncture resistance requirements in § 179.105-5.

Section 179.202-18 Ethylene oxide.

It is proposed to add a new paragraph (a) (10) in § 179.202-18 to require that each specification 111 tank car used after December 31, 1986 for the

transportation of ethylene oxide, with a capacity exceeding 18,500 U.S. gallons, conform to class 111.

Section 179.203 Special requirements for specification 111 tank cars.

It is proposed to add a new section setting out special requirements for specification 111 tank cars that is parallel to § 179.106 for specification 105 tank cars.

Economic Impact

MTB has determined this proposed rule is not a "major rule" under the terms of Executive Order 12291, but it is "significant" under DOT procedures (44 FR 11034). A regulatory evaluation and environmental assessment is available in the Docket at the address shown above. Based on the comments received in response to the ANPRM and the information contained in the regulatory evaluation, I certify that this proposal will not have a significant economic impact on a substantial number of small entities under the provisions of the Regulatory Flexibility Act.

List of Subjects in 49 CFR Parts 173 and 179

Railroad safety, Hazardous materials transportation.

In consideration of the foregoing proposed rule, Parts 173 and 179 of Title 49 Code of Federal Regulations would be amended as follows:

PART 173—SHIPPERS—GENERAL REQUIREMENTS FOR SHIPMENTS AND PACKAGINGS

1. In § 173.124, paragraph (a) (5) would be amended by adding paragraph (iii) and (iv) to read as follows:

§ 173.124 Ethylene oxide.

(a) * * *

(5) * * *

(iii) After December 31, 1986, each specification 105 tank car built before September 1, 1981, and with a water capacity (shell full volume, including manways) exceeding 18,500 U.S. gallons, used for the transportation of ethylene oxide, shall conform to specification 105J.

(iv) After December 31, 1986, each specification 111 tank car with a water capacity (shell full volume, including manways) exceeding 18,500 U.S. gallons, used for the transportation of ethylene oxide, shall conform to DOT specification 111J.

2. In § 173.314, notes 23 and 24 to the table in paragraph (c) would be revised to read as follows:

§ 173.314 Requirements for compressed gases in tank cars.

* * * * *

(c) * * *

Note 23.—Each specification 105 tank car built after August 31, 1981, shall conform to class DOT-105J. After December 31, 1986, each specification 105 tank car built before September 1, 1981, and with a water capacity (shell full volume, including manways) exceeding 18,500 U.S. gallons shall conform to class DOT-105J. After December 31, 1986, each specification 111 tank car with a water capacity (shell full volume, including manways) exceeding 18,500 U.S. gallons shall conform to class DOT-111J.

Note 24.—Each specification 105 tank car built after August 31, 1981, shall conform to class DOT-465S. After December 31, 1986, each specification 105 tank car built before September 1, 1981, and with a water capacity (shell full volume including manways) exceeding 18,500 U.S. gallons, shall conform to class DOT-105S.

* * * * *

PART 179—SPECIFICATIONS FOR TANK CARS

3. In § 179.102-12, paragraph (a) (10) would be added to read as follows:

§ 179.102-12 Ethylene oxide.

(a) * * *

(10) After December 31, 1986, each tank built before September 1, 1981, and with a water capacity (shell full volume, including manways) exceeding 18,500 U.S. gallons, used for the transportation of ethylene oxide, shall conform to class DOT-105J.

4. In § 179.105-7, paragraph (c) would be added to read as follows:

§ 179.105-7 Safety relief valves.

* * * * *

(c) Notwithstanding paragraph (a) of this section, § 179.100-15, and § 179.102-11, the relieving or discharge capacity of a specification 105 or 111 tank car built before (the effective date of the final rule) and with a manway cover having a dimension or diameter of less than 18 inches may be calculated in accordance with the formula prescribed in AAR Specifications for Tank Cars, Section A 8.02, of Appendix A applicable to compressed gases in insulated tanks, if—

(1) The tank car is equipped with a thermal protection system in accordance with § 179.105-4; and

(2) In all of the three consecutive simulation pool fire tests required by paragraph (d) of § 179.105-4, none of the thermocouples on the uninsulated side of the steel plate indicates a plate temperature in excess of 540°F.

5. In § 179.106-1, paragraph (e) would be added to read as follows:

§ 179.106-1 General.

* * * * *

(e) Notwithstanding the provisions of § 173.8 of this subchapter, no specification 105 tank car manufactured before September 1, 1981 to specifications promulgated by the Canadian Transport Commission and with a water capacity (shell full volume, including manways) exceeding 18,500 U.S. gallons, may be used after December 31, 1986 to transport hazardous materials unless it is equipped in accordance with § 179.106-3.

6. Section 179.106-3 would be revised to read as follows:

§ 179.106-3 Previously built cars.

(a) Each specification 105A tank car built before March 1, 1981, shall be equipped with a coupler restraint system that meets the requirements of § 179.105-6.

(b) Each specification 105S tank car built before September 1, 1981, shall be equipped with:

(1) A coupler restraint system that meets the requirements of § 179.105-6; and

(2) A tank head puncture resistance system that meets the requirements of § 179.105-5.

(c) Each specification 105J tank car built before September 1, 1981, shall be equipped with:

(1) A coupler restraint system that meets the requirements of § 179.105-6;

(2) A thermal protection system that meets the requirements of § 179.105-4;

(3) A safety relief valve that meets the requirements of § 179.105-7; and

(4) A tank head puncture resistance system that meets the requirements of § 179.105-5.

7. Section § 179.200-27 would be added to read as follows:

§ 179.200-27 Alternative requirements for tank head puncture resistance systems.

Tank cars required to have puncture resistance systems in accordance with § 179.105-5 may, as an alternative, be equipped with a head shield, at the end of each car in accordance with a head shield at the end of each car in accordance with the requirements of § 179.100-23.

8. In § 179.202-18, paragraph (a) (10) would be added to read as follows:

§ 179.202-18 Ethylene oxide.

(a) * * *

(10) After December 31, 1986, each tank built with a water capacity (shell full volume, including manways) exceeding 18,500 U.S. gallons shall conform to class DOT-111J.

9. Section 179.203 would be added to read as follows:

§ 179.203 Special requirements for specification 111 tank cars.

§ 179.203-1 General.

(a) In addition to the requirements of this section, each tank car built under specification 111 shall meet the applicable requirements of §§ 179.200, 179.201, and 179.202.

(b) Notwithstanding the provisions of §§ 179.3, 179.4, and 179.6, AAR approval is not required for changes in or additions to specification 111 tank cars in order to comply with this section.

(c) Notwithstanding the provisions of § 173.8 of this subchapter, no specification 111 tank car manufactured to specifications promulgated by the Canadian Transport Commission may be used after February 28, 1985, to transport hazardous materials in the United States unless it is equipped with

a coupler vertical restraint system that meets the requirements of § 179.105-6.

(d) Notwithstanding the provisions of § 173.8 of this subchapter, no specification 111 tank car manufactured before October 1, 1981 to specifications promulgated by the Canadian Transport Commission and with a water capacity (shell full volume, including manways) exceeding 18,500 U.S. gallons, may be used after December 31, 1986 to transport flammable gases or ethylene oxide unless it is equipped in accordance with § 179.203-2.

§ 179.203-2 Previously built cars.

(a) Each specification 111J tank car built before (the effective date of the final rule) shall be equipped with:

(1) A coupler vertical restraint system that meets the requirements of § 179.105-6;

(2) A thermal protection system that meets the requirements of § 179.105-4;

(3) A safety relief valve that meets the requirements of § 179.105-7; and

(4) A tank head puncture resistance system that meets the requirements of § 179.105-5.

§ 179.203-3 Stenciling.

Each specification 111 tank car built before (the effective date of the final rule) that is equipped as prescribed in § 179.203-2(a) shall be stenciled by having the letter "J" substituted for the letter "A" in the specification marking.

(49 U.S.C. 1803, 1804, 1808; 49 CFR 1.53, Appendix A to Part 1 and paragraph (a)(4) of Appendix A to Part 106)

Issued in Washington, D.C. on March 30, 1983.

Alan I. Roberts,

Associate Director for Hazardous Materials Regulation, Materials Transportation Bureau.

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